REMARKS

Reconsideration of the application is requested in view of the amendment to the claims and the remarks presented herein.

The claims in the application are claims 1, 3, 5 to 7, 10, 12 to 22 and 36 to 48, all other claims having been cancelled. Claims 41 to 44 have been allowed and now independent claim 45 is deemed allowable since it has been objected to as being dependent on a rejected claim.

Claims 1, 3, 5 to 7, 10, 12, 13, 15 to 29 and 46 to 48 were rejected under 35 USC 103 as being obvious over the Forquy patent taken in view of the Lang et al and Ito et al patents and claims 1, 3, 5 to 7, 12, 14 to 19, 47 and 48 were rejected under 35 USC 103 as being obvious over the Kobylinski et al patent taken in view of the Forquy et al patent. The Examiner states that Forquy discloses a catalyst comprised of ruthenium sulfide and at least one other transition metal including cobalt on a support. The Examiner concedes Forquy does not disclose a "conductive carbon black support" but cites Lang et al as showing a catalyst on a "preformed carbon support" including carbon black and the Examiner concludes that carbon black and active carbon are known catalyst supports. Kobylinski et al is cited as showing a catalyst by coating a support with a ruthenium or rhodium sulfide with a platinum metal sulfide. The Examiner concedes it does not teach electrocatalyst or a conducive support but it would be obvious to have this. The Examiner concedes cobalt sulfide is not taught but cites Forquy as showing this.

Applicants traverse these grounds of rejection as the combination of the prior art that the Examiner has made with the benefit of Applicants' teaching would not suggest Applicants' invention. It is believed that the Examiner has clearly failed to appreciate the gist of Applicants' invention since the Examiner keeps citing new prior art that is totally unrelated to the field of electrocatalysts.

The Examiner has again cited the Forquy et al patent which as can be seen from Professor Faita's declaration which the Examiner failed to comment on in no way relates to Applicants' invention using a conductive carbon black support. The declaration clearly shows that active carbon and the other supports of Forquy et al are not conductive and cannot carry out Applicants' conductive function.

The Lang et al reference, even if combined with Forquy patent is again directed to a catalyst having hydrogenation activity and would not be considered by one skilled in the art wishing to solve the technical problem of providing an electrocatalyst for oxygen reduction resistant to a chlorinated hydrochloric environment. Neither electrocatalysis or oxygen reduction are mentioned in Lang et al., nor the specific embodiment of ruthenium sulfide is the object of a specific example or is otherwise cited as preferred. The least one can say is that ruthenium sulfide is a purposive selection over the catalyst range disclosed in Lang et al., which additionally fails to mention conductive carbon supports.

But the sentence which clearly demonstrates how far is the Examiner from appreciating the technical content of the invention is to be found on page 3 of the Office Action, referring back to Forquy's patent:

"The catalyst of Forquy's et al. would be expected by one of ordinary skill in the art to function as an "electrocatalyst for oxygen reduction", absent the showing of convincing evidence on the contrary (!) first of all Prof. Faita's declaration is evidence of the contrary, and secondly one considering the non conductive catalyst for THT dehydrogenation of Forquy et al. as a viable candidate to function in oxygen reduction electrocatalysis, would per se show to lack any skill whatsoever in the art of electrocatalysis, given the fact that electrical conductivity is one of the key points to be taken into consideration.

To summarize:

* the invention belongs to the field of electrocatalysis, in particular to electrocatalysts for oxygen reduction suitable for hydrochloric acid electrolysis;
* the technical problem to be solved is that most known electrocatalysts capable of electrochemically reducing oxygen are leached by the electrolyte in hydrochloric acid electrolysis processes;
* the closest prior art consists of rhodium sulfide supported on conductive carbon black, which is active and stable in

such an electrolytic environment but that is way too expensive. Moreover, the world-wide rhodium production will probably not be able to sustain the whole market of hydrochloric acid electrolysis at its projected peak;

* the solution provided by the present invention consists of a ruthenium-cobalt sulfide supported on a conductive carbon black, as claimed in present claim 1;

• novelty of claim 1 is not presently challenged.

After utility and novelty are established, section 103 makes patentability depend upon non-obviousness of the invention to be patented. The first sentence of this section requires that:

(1) the scope and content of the prior art be determined;

(2) the differences between the prior art and the claims in issue be ascertained;

(3) the level of ordinary skill in the pertinent art be resolved

Referring to item (1), scope and content of the pertinent art of electrocatalysis must be determined, that is of a science dealing with developing electrically conductive catalysts to enhance electrochemical reactions in suitable cells and electrolysers. One of skill in the art would therefore have taken into consideration US Patents No. 5,958,197 and No. 6,149,782 (cited in the application), which disclose electrocatalysts for oxygen reduction in a hydrochloric

environment. Additionally, of all the documents cited by the Examiner, one of skill in the art would only have considered the Reeve et al. article, which is directed to electrocatalysts. At best, he would also have considered searching technical disclosures dealing with stability of noble metal compounds in a chlorinated hydrochloric environment.

On the other hand, one of skill in the art would never have dreamed taking into consideration the remaining documents cited by the Examiner, which are neither directed to oxygen electroreduction (or at least to oxygen chemical reduction, which would already be quite remote), nor to electrocatalysis, chlorinated hydrochloric electrolytes and so on. One of ordinary skill in the art would neither have assumed that Forquy's catalyst would function as an "electrocatalyst for oxygen reduction" nor the contrary; he would simply have ignored or dismissed such document - which is directed to a remote technical field, does not address solubility or stability in hydrochloric acid, does not cite any viable support for use in electrocatalysis, has no reference to electrochemistry at all - as non pertinent to the subject.

Additionally, one of skill in the art of electrocatalysis and/or electrochemistry would never dream of considering obvious the substitution of cobalt for molybdenum (page 5 of the office action), given their different electronic configuration: the two elements might be similar for other purposes (e.g. in Forquy's own field of application, which is heterogeneous catalysis), but

they are not in electrochemistry. Again, oxygen and sulfur are similar elements under many aspects, since they belong to the same chemical group and have many analogies. Nevertheless, one would not recommend the Examiner to replace H_2O with H_2S in her diet. Therefore, withdrawal of these grounds of rejection is requested.

Claims 20 to 22 and 36 to 40 have been rejected under 35 USC 103 as being obvious over the Reeve et al reference taken in view of Forquy et al, Lang et al and Ito et al. Reeve et al is cited as showing carbon supported transition metal sulfide electrocatalysts such as $Mo_xRu_yS_z$ as gas diffusion electrodes. The secondary art is applied as above.

Applicants traverse this ground of rejection as the combination of the prior art in no way teaches Applicants' invention. The Reeve et al reference relates to catalysts of MoRuS, MoRhS, MoOsS, NruS and ReRus or carbon black for oxygen reduction activities and has no relationship to CoRuS electrocatalyst for oxygen reduction. The secondary references have all been discussed with respect to their deficiencies and the combination in no way relates the problems involved and solved by Applicants' invention. Therefore, withdrawal of this rejection is requested as one cannot combine apples and oranges.

In view of the amendments to the claims and the above remarks, it is believed that the claims point out Applicants' patentable contribution. Therefore, favorable reconsideration of the application is requested.

Respectfully submitted,

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Enclosures

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I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

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